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HYMENOPTEROUS PARASITES FROM THE EGGS OF AQUATIC AND SEMI-AQUATIC INSECTS.*

By

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This survey of the aquatic insect eggs of the Douglas Lake region for hymenopterous parasites, and the possible opportunity of studying the habits and life histories of some of these minute wasps, were suggested by Dr. H. B. Hungeford. The writer is indebted to Dr, Hungerford for aid in determining the hosts and to Dr. H. Morrison of the U. S. National Museum, who transmitted the reared parasites to Mr. A. B. Gahan, who kindly identified them.

It was in 1863 that Lubbock (16) published his descriptions of **Polynema natans and Prestwichia aquatica.** Since then, the following papers have been published concerning **Prestwichia aquatica** Lubbock: Enock (6-10), Henriksen (14), Rimsky-Korsakov (21), Thienemann (28), Ussing (30), Willem (33), and Willem (34). Various of these writers have recorded it as parasitizing the eggs of **Notonecta, Dytiscus marginalis, Uelobius, Ranatra linearis, Aphelocheirus montandoni, Agabus, Colymbetes, Graphoderes, Agrion,** and **Erythromma najas. Caraphractus cinctus** Walker (**Polynema natans** Lubbock) is known to parasitize the eggs of **Calopteryx virgo** (24), **Dytiscus** (29), and **Notonecta** (20). **Tiphodytes gerriphagus** (Marchal) [Bradley (3), in 1902, proposed the new name **Tiphodytes** for **Limnodytes,** which was preoccupied.] and the neighboring species **setosus** (5) have been reared from **Gerris** eggs. In 1900, Ashmead (1) recorded five new parasites bred from the eggs of **Lestes** species by Prof. J. G. Needham. In Europe, **Anagrus subfuscus** Forst. and **Anagrus**

* Contribution from the Biological Station of the University of Michigan.

bracheri Schultz have been bred from different kinds of Odonata eggs. Matheson and Crosby (20), in 1912, described **Hydrophylax aquivolans** as a parasite of **Ischnura** eggs. Lists of other egg parasites and their hosts as well as those mentioned may be found in the following works: Girault (11), Girault (12), Henriksen (13), and Martin (18). The last reference contains a host list of **Trichogramma minutum** Riley.

The Douglas Lake region abounds with numerous creeks, bogs, and pools, all of which yield a bountiful supply of aquatic insect eggs. The eggs collected by the writer in this vicinity were transported to the laboratory in water, divided according to kind and place of collection, and isolated in improvised rearing cages. A single cage was made from a quart food container, cylindrical in shape. It supported a four inch vial, open at both ends, which was placed on one side of the container about an inch from the top. The end of the vial which fitted in the cylinder was kept stationary by means of adhesive tape; the other end was tightly corked. The bottom cap of the container was then removed, a jelly glass containing lake water and the eggs to be kept under observation was set in this cap, which was then replaced. The vial proved to be of great aid in the capturing of those small parasites that were positively phototropic. Mass rearing was tried and in some cases several hundred eggs were placed in a single cage. In the accompanying chart, the data are compiled according to host.

The number of parasites that this study yielded was disappointingly small, but yet I believe some of the records are interesting. Mr. Gahan (in communication) states that the **Anagrus** sp., which the writer found, is apparently very close to **A. subfuscus** Forst., if not identical with it. In the absence of European specimens for comparison, however, and in view of the different hosts, he did not consider it advisable to call it that. Mr. Gahan also mentioned the fact that the only specimens he had previously seen of this species of **Anagrus** were two taken from the stomach of a trout at Ithaca, New York. One of the wasps that emerged from a cage containing Gyrinid eggs on July 19, 1930, was extremely active and lived until July 25. An attempt was made to get it to parasitize freshly laid Gyrinid eggs, but the effort was futile. Mr. Gahan questions the specific determination of the **Trichogramma** concerned

because of its much darker color than the typical **Trichogramma minutum** Riley, and not because of any structural differences.

In the laboratory, several specimens of **T. minutum** Riley ? were introduced into four inch vials containing lake water, a little sugar, and one of the following kinds of eggs: **Ranatra,** Belostomatid, **Nymphula, Galerucella,** Hydrometrid, water mite, Gyrinid, Gerrid, Corixid, **Donacia,** and Notonectid. These experiments were started on July 15, and all except one proved to be negative. Approximately 30 specimens of **T. minuta** Riley ? were found August 1 webbed in the scum covering the water mite egg mass. **Tiphodytes gerriphagus** (Marchal) was also introduced with many of the kinds of eggs enumerated above, but only negative results were obtained.

Matheson and Crosby (20), in 1912, described **Hydrophylax aquivolans** as new, and recorded it as parasitic on the eggs of **Ischnura.** The writer is now able to record a new host for this parasite, namely, **Mesovelia mulsanti bisignata** Uhl. The parasites came to his attention while work was in progress on the biology of some North American species of **Mesovelia** Muls. A number of decayed cattail leaves had been collected at Potter's Lake on our campus early in January, and on January 9, five specimens of **Hydrophylax aquivolans** Matheson & Crosby were captured. One small piece of cattail leaf which was pulled apart revealed 44 empty **Mesovelia** egg shells in their normal position. Each contained a small hole, usually at the attached end of the egg, from which the parasites issued.

Results of the 1930 Survey of Aquatic Insect Eggs for parasites in the Douglas Lake Region, Michigan.

Host	No. of eggs	Date collected	No. of egg parasites and kind
Ranatra	5257	7/4—7/29	—
Hydrophilidae	509*	7/4—7/17	—
Nymphula	2230	7/4—7/11	—
Sialis infumata	—	7/4—7/7	Many **Trichogramma minuta** Riley ?
Gerridae	133	7/4—7/15	29 **Tiphodytes geriphagus** (Marchal)

* Egg cases

Gyrinidae	40,367	7/4—7/20	5 **Anagrus** sp.
Donacia	7638	7/4—7/16	—
Notonectidae	970	7/5—7/20	—
Galerucella	2808	7/5—7/12	—
Corixidae	1099	7/6—7/20	—
Belostomatidae	630	7/7—7/28	—
Damsel-fly	6711	7/7—7/16	—

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THE GENUS PARABOLOCRATUS IN NORTH AMERICA

(Homoptera, Cicadellidae)

By

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The chief external character upon which the author has based his separation of the species of this genus of Cicadellids is the structure of the head. Here it was found that the length of the vertex, the shape of its apex, the definiteness of the margin, the presence or absence of a brown line below the margin, and the profile of the face could all be used to separate species. Other structures of importance are the external genitalia. In the female, the posterior margin of the last ventral segment has rather constant characters; the pygofer varies from long and slender in **brunneus** to short and broad in **grandis;** and the ovipositor much exceeds the pygofer in **conus** while barely exceeding the pygofer in **grandis.** In the male, the pygofer is long and slender in **attenuatus** and rather short and broad in the other species; the valve varies from being concealed in **grandis** to broad and triangular in **kansiensis.** Additional characters which have proved valuable in separating the species are the general size and shape of the body, color, and the size, shape, length and markings of the elytra. The oedagus of the male furnished a very valuable and definite character for the separation of the members of this sex, as is shown by the drawings.

Four species and one variety were previously known in the genus. Six new species are described in this paper.

Description of the Genus

Rather large and flat species, green or yellowish green in color.

Head usually narrower than pronotum; flattened, anterior margin more rounded in female, more angulate in male; margin of vertex usually quite definite at least in females; ocelli on margin near the eyes. Pronotum gradually widened posteriorly. Elytra both brachypterous and macropterous in females; macropterous in males.

* Contribution from the Department of Entomology, University of Kansas.

Female last ventral segment always definitely longer than preceding, posterior margin variable. Ovipositor always well exceeding sparsely spined pygofer. Male plates usually long, with slender apices always exceeded by the strongly spined pygofer.

Connective of internal male genitalia Y-shaped. Claspers triangular when viewed dorsally, with large apical spur. Oedagus long, bearing a pair of simple or biramous processes near apex.

Key to Males of Parabolocratus

A. Vertex with very definite margin; brown line below margin of vertex usually present.
  B. Margin of vertex quite thin; front nearly straight in profile.
    C. Elytra apple green with fuscous tips; valve narrow ..... **planus** sp. n.
    CC. Elytra uniformily yellowish green; valve broad ..... **kansiensis** sp. n.
  BB. Margin of vertex distinctly thicker; front inflated in profile.
    C. Vertex of about same length as pronotum; rather slender species ..... **viridis** (Uhler)
    CC. Vertex distinctly shorter than pronotum; rather robust species.
      D. Vertex over one-half as long as wide; large species, 6 mm. or over in length .... **major** Osborn
      DD. Vertex about one-half as long as wide; small species, 5.5 mm. or less in length .... **curtus** sp. n.

AA. Vertex without definite margin; brown line below of vertex absent.
  B. Smaller, not over 4 mm. in length .... **brunneus** Ball
  BB. Larger, over 4 mm. in length.
    C. Pygofer very long, twice as long as plates .... **attenuatus** sp. n.
    CC. Pygofer short, not over one-third longer than plates.
      D. Tips of elytra brownish with white areoles; with small brown spots at tip of clavus and at end of fourth apical cell..... ..... **flavidus** Signoret.
      DD. Elytra unicolorous; with small brown spot at tip of clavus only.....**grandis** sp. n.

Key to Females of Parabolocratus

A. Brown line below margin of vertex definite.
  B. Vertex nearly as long as wide and definitely angulate apically ..... **attenuatus** sp. n.
  BB. Vertex distinctly shorter than wide and at most but slightly angulate apically.
    C. Elytra exceeding ovipositor; vertex definitely shorter than pronotum ..... **curtus** sp. n.
    CC. Elytra exposing at least tip of ovipositor; vertex usually about same length as pronotum ..... **viridis** (Uhler)

AA. Brown line below margin of vertex absent or indistinct.
  B. Vertex as long as or longer than wide.
    C. Vertex margin thin, broadly rounded apically ..... **grandis sp. n.**
    CC. Vertex margin not thin, acutely angulate apically ..... **conus sp. n.**
  BB. Vertex shorter than wide.
    C. Vertex distinctly broadly rounded apically ..... **major** Osborn
    CC. Vertex at least slightly angulate apically.
      D. Elytra with small brown spots at tip of clavus and at end of fourth apical cell..... ..... **flavidus** Signoret
      DD. Elytra with small brown spot, if any, only at tip of clavus.
        E. Vertex margin thin and distinct.
          F. Yellowish green; disc of vertex not strikingly flat ....**kansiensis** sp. n.
          FF. Apple green; disc of vertex strikingly flat .....**planus** sp. n.
        EE. Vertex margin thick and indistinct .... **brunneus** Ball

Parabolocratus attenatus sp. n.

Pl. 1, figs. 3, 12; pl. II, figs. 4, 13; pl. III, figs. 8, 8a.

Allied to **flavidus** but more slender and with vertex longer. Head narrower than prothorax, vertex rather acute and as long as pronotum; male pygofer very long. Length, female 6.9 mm.; male 5.1 to 5.2 mm.

Vertex of female as long as wide, distinctly more acute than in **flavidus,** margin definite, slightly reflexed, but not at all foliaceous; vertex of male slightly longer than wide, quite acute apically, margin more rounded

than in female. Pronotum about as long as vertex, slightly widened posteriorly. Elytra in both sexes long and slender, equalling or slightly exceeding abdomen.

Color: Female yellowish green; male somewhat paler. Face of female with narrow dark brown line extending from eye to eye just below margin of vertex. Lateral margins of pronotum whitish. Elytra with base of costal margins white, apices brownish, usually with small dark brown spots at tip of clavus and at end of fourth apical cell. Tip of ovipositor reddish.

External genitalia: Female last ventral segment almost twice as long as preceding, posterior margin broadly rounded and with a faint median notch; ovipositor exceeding pygofer by about one-fourth the length of the latter. Male valve very small; plates strongly narrowed on basal half, then produced into long blunt tips; pygofer very long and narrow, about twice as long as plates, apex very acute.

Internal male genitalia: Oedagus very long, sides nearly parallel when viewed dorsally, narrowed preapically and widened again to bear a biramous process on each side, the cephalic branch of each process being distinctly wider than the caudal; gonopore opening at apex.

Holotype, female, Mescal, Ariz., July 28, 1927, R. H. Beamer. **Allotype,** male, same data. **Paratype,** male, same data. Types deposited in Snow Entomological Collection.

Parabolocratus curtus sp. n.

Pl. I, figs. 2, 13; pl. II, figs. 9, 10; pl. III, figs. 7, 7a.

Closely allied to **viridis** but with vertex shorter. Elytra exceeding abdomen in both sexes, and with dark line below margin of vertex distinct. Length, female 6.7 mm.; male 5.4 mm.

Vertex much shorter than wide, being about one-half as long as wide in male, anterior margin slightly angulate, margin definite, slightly reflexed but not at all foliaceous. Pronotum of female one-sixth longer than vertex; pronotum of male one-third longer than vertex. Elytra in both sexes long and slender, exceeding abdomen.

Color: Yellowish green. Dark brown line below margin of vertex extending from eye to eye. Lateral margins of pronotum whitish. Elytra with costal mar-

gins whitish, apices slightly brownish, usually with a small dark brown spot at tip of clavus. Tip of ovipositor reddish.

External genitalia: Female last ventral segment at least twice as long as preceding, posterior margin roundingly produced; ovipositor exceeding pygofer by one-fourth the length of the latter. Male valve broad and triangular; plates strongly narrowed on basal third, then produced into long acute tips; pygofer about one and one-third times as long as plates, apex rather acute and open ventrally, with distinct preapical notch on ventral margin.

Internal male genitalia: Oedagus long, parallel-margined, with dorso-lateral margins bearing faint teeth, with preapical triangular wing-like processes, and a pair of apical unbranched processes; gonopore opening ventrad of winglike processes.

Holotype, female, Riley County, Kans., May 23, 1928. **Allotype,** male, Ellsworth County, Kans., July 20, 1929, D. A. Wilbur. Types deposited in Snow Entomological Collection.

Hitherto this species has been confused with **viridis.** It differs, however, from that species in the shorter vertex and the longer elytra of the female.

Parabolocratus viridis (Uhler)

Pl. 1, figs. 5, 16; pl. 11, figs. 6, 15; pl. III, figs. 1, 1a.

Glossocratus viridis Uhler, Bul. U. S. Geol. Geog. Surv., III, p. 462, 1877.

A rather large species with vertex broadly rounded in female; somewhat angulate in male. Dark line below margin of vertex usually quite distinct in both sexes. Length, female 6.5 to 8.8 mm.; male 4.9 to 6.3 mm.

Vertex considerably shorter than wide, anterior margin broadly rounded to slightly angulate, margin definite, usually distinctly reflexed, but not foliaceous. Pronotum usually as long as or slightly longer than vertex. Elytra of female exposing one or two abdominal segments or only the ovipositor; elytra of male rather narrow and strongly exceeding abdomen.

Color: Usually yellowish green, sometimes apple green. Dark brown line below margin of vertex which may extend from eye to eye, or be reduced to just a short brown line at apex. Lateral margins of pronotum whitish. Elytra with costal margins usually whitish,

apices slightly brownish, usually with a small dark brown spot at tip of clavus. Tip of ovipositor reddish.

External genitalia: Female last ventral segment about twice as long as preceding, posterior margin slightly to moderately produced or sometimes practically truncate; ovipositor exceeding pygofer by about one-fourth the length of the latter. Male valve broad and triangular; plates strongly narrowed on basal third, then produced into long and acute tips; pygofer short, about one and one-third times as long as plates, apex rather acute and open ventrally, with distinct preapical notch on ventral margin.

Internal male genitalia: Oedagus long, narrowed apically, bearing a pair of unbranched processes at apex, these processes being rather stout and acutely tapered at apex; gonopore opening on ventral side, cephalad of apex.

Distribution: This species has hitherto been recorded from Quebec, Ontario, N. Y., N. H., Pa., Mass., Conn., N. J., Tenn., Ill., Ia , Mo., Colo., Calif.; Mont., and Kansas. Specimens are at hand from the following additional localities: British Columbia, Wash., Ore., Id., Ariz., Ut., Tex., Neb., and N. D.

The vertex of the female while usually of about the same length as the pronotum is not uncommonly slightly shorter or longer than the pronotum; the vertex of the male varies from two-thirds as long to as long as pronotum. Front quite variable in both sexes, strongly convex to nearly straight in profile. Several females of a large series collected in Oroville, Wash., were observed to be definitely straw colored. It is entirely possible that more than one species is still being included under this name.

Parabolocratus viridis var. **montanus** Ball

Parabolocratus viridis var. **montanus** Ball, Rept. Ia. Acad. Sci. for 1899, p. 71, 1900.

Structurally the same as **viridis**; straw colored, margin of pronotum whitish; elytra straw colored except for broad dark brown stripe extending from base to near apex.

Distribution: Described by Dr. Ball from specimens taken "from the headwaters of the Little Beaver, Colo." The author has before him a single female, collected by Paul W. Oman, Aug. 17, 1929, Sloss, Colo.

Parabolocratus grandis sp. n.

Pl. I, figs. 6, 17; pl. II, figs. 7, 17; pl. III, figs. 2, 2a.

Allied to **major** but with longer vertex. Head as wide as prothorax; strongly foliaceous in female. Length, female 7.4 to 9.1 mm.; male 5 to 5.7 mm.

Vertex of female as long as or longer than wide, anterior margin broadly rounded, margins quite definitely foliaceous and reflexed; vertex of male shorter than wide, quite acute apically, margin not foliaceous but distinct. Pronotum of female much shorter than vertex, not widened posteriorly; pronotum of male as long as vertex. Elytra of female exposing last four or five abdominal segments; elytra of male long and slender, definitely exceeding abdomen.

Color: Yellowish green. Lateral margins of pronotum whitish. Elytra with base of costal margins whitish, and with small dark brown spot at tip of clavus. Tip of ovipositor reddish.

External genitalia: Female last ventral segment about one and one-half times as long as preceding, posterior margin practically truncate, slightly produced medially; ovipositor barely exceeding pygofer. Male valve concealed; plates strongly narrowed on basal half, then produced into long, narrow, acute tips; pygofer short, about one and one-third times as long as plates, apex very acute and slightly open ventrally.

Internal male genitalia: Oedagus short, sides nearly parallel when viewed dorsally, widened preapically then narrowed at apex to bear a pair of biramous processes, the branches of each process being about equal in length and very slender. The caudal half of the oedagus also bears two rows of teeth along the dorsolateral margins; gonopore opening at apex.

Holotype, female, Cherokee County, Kans., Aug. 31, 1927, R. H. Beamer. **Allotype,** male, Phillips County, Kans., July 8, 1925, R. H. Beamer. A large series of **paratypes** are on hand from Allen, Douglas, and Riley counties, Kans.; Karnes County, Tex.; Prattsville and Burnsville, Ala., and Hilliard, Fla.

Holotype, allotype and some **paratypes** in Snow Entomological Collection; other **paratypes** in collection of Kansas State College of Agriculture and Applied Sciences and in the United States National Museum.

Hitherto this species, especially the male, has been

confused with **flavidus.** The female, however, is much larger and has a much more foliaceous head. The males lack the brownish apical cells and white areoles of **flavidus.**

Parabolocratus conus sp. n.

Pl. I, fig. 4; pl. II, fig. 11.

Allied to **brunneus** but with longer vertex. A large species with long, acute and non-foliaceous vertex in the female. Length, female 7.5 mm.

Vertex slightly longer than wide, distinctly cone shaped, margin definite, front very full. Pronotum about three-fifths as long as vertex. Elytra broad, broadly rounded at apices, exposing last three abdominal segments.

Color: Green. Vertex with a pair of small brown spots at apex. Lateral margins of pronotum and costal margins of elytra whitish. Dorso-cephalic half of pygofer with two pairs of small round black spots. Tip of ovipositor brownish.

External genitalia: Last ventral segment of female over twice as long as preceding, posterior margin with a distinct median lobe and distinct lateral angles; ovipositor exceeding pygofer by about one-half the length of the latter.

Holotype, female, Torrance County, N. Mex., June 12, 1931, J. G. Shaw. Type deposited in Snow Entomological Collection.

Parabolocratus major Osborn

Pl. 1, figs. 10, 14; pl. II, figs. 1, 18; pl. III, figs. 5, 5a.

Parabolocratus major Osborn, Me. Agr. Exp. Sta., Bull. No. 238, p. 110, 1915.

Allied to **viridis** but larger and much broader. Margin of vertex more rounded and more definite and reflexed than in **viridis.** Length, female 7.5 to 9 mm.; male 5.9 to 6.8 mm.

Vertex definitely shorter than wide, margin broadly rounded, quite distinct and rather strongly reflexed, but hardly foliaceous. Pronotum of female shorter than vertex; pronotum of male longer than vertex. Elytra of female wide, exposing last two abdominal segments; elytra of male rather wide and exceeding abdomen.

Color: Yellowish green. Dark brown line below margin of vertex in male; sometimes in female. Lateral margins of pronotum usually whitish. Elytra

with base of costal margins usually whitish, apices usually brownish, brown spot at tip of clavus present in the male but very small and faint. Tip of ovipositor reddish.

External genitalia: Female last ventral segment definitely longer than preceding, posterior margin slightly produced to apex; ovipositor exceeding pygofer by about one-fourth the length of the latter. Male valve broad and triangular; plates strong narrowed on basal half, then produced into long rather acute tips; pygofer short, about one and one-third times as long as plates, apex rather acute and open ventrally, with distinct preapical notch on ventral margin.

Internal male genitalia: Oedagus quite large and stout, narrowed apically when viewed dorsally, bearing a pair of rather wide and long unbranched processes preapically. The oedagus also bears two rows of teeth on the median third of the dorso-lateral margins, and some smaller teeth on the ventral margin. Oedagus almost parallel when viewed laterally, widened at apex, with gonopore opening ventrally.

Distribution: This species has hitherto been recorded from Me. and Ohio. Specimens are at hand from the following additional localities: Mich., Wis., Colo., Mass., Ind., and Canada.

Parabolocratus flavidus Signoret

Pl. I, figs. 8, 15; pl. II, figs. 5, 16; pl. III, figs. 4, 4a.

Parabolocratus flavidus Signoret, Ann. Soc. Ent. Fr, ser. 5, 1X, p. 276, pl. 8, fig. 31, 1879.

A rather stout species with vertex shorter than wide. Apical cells of elytra brownish with small white areoles. Length, female 5.4 to 7.9 mm.; male 4.6 to 5:9 mm.

Vertex of female shorter than wide, angulate, slightly reflexed, but not at all foliaceous. Vertex of male shorter than wide, quite acute apically, margin more rounded than in female. Pronotum as long as vertex. Elytra of female rather broad, exposing one or two abdominal segments or equalling the tip of the ovipositor; elytra of male rather narrow and strongly exceeding abdomen.

Color: Female yellowish green; male somewhat paler. Face with a pale orange area below apex of vertex. Lateral margins of pronotum whitish. Elytra with base of costal margins whitish, apices brownish, with small areoles in anteapical and apical cells and

usually with a small dark brown spot at tip of clavus and another at end of fourth apical cell. Tip of ovipositor reddish.

External genitalia: Female last ventral segment varying from one and one-half to two and one-half times as long as preceding, posterior margin gradually produced to apex; ovipositor exceeding pygofer by about one-fourth the length of the latter. Male valve quite small; plates strongly narrowed on basal third, then produced into long narrow tips; pygofer short, about one and one-third times as long as plates, apex acute and closed.

Internal male genitalia: Oedagus long, sides nearly parallel to apex which bears a biramous process on each side, the lateral branches of each process close together, about equal in length, slightly wider than in **grandis;** gonopore opening at apex.

Distribution: This species has hitherto been recorded from N. C., Fla., Ala., Ia., Kans., and Tex. Specimens are at hand from the following additional states: Ark., La., Miss., Va., and Ga.

Parabolocratus kansiensis sp. n.

Pl. I, figs. 1, 9; pl. II, figs. 3, 14; pl. III, figs. 6, 6a.

Closely allied to **planus** but with disc of vertex not as flat and vertex of male more acute. Length, female 8.1 to 8.2 mm.; male 5.5 to 6.1 mm.

Vertex somewhat shorter than wide, rather angulate apically, margin very thin, strongly reflexed and quite foliaceous. Pronotum of female slightly shorter than vertex; pronotum of male as long as vertex. Elytra of female exposing one or two abdominal segments; elytra of male strongly exceeding abdomen.

Color: Pale yellowish green. Female with brown line below margin of vertex absent or very faint; male with rather definite brown line below margin of vertex. Elytra unicolorous. Tip of ovipositor reddish.

External genitalia: Female with last ventral segment very definitely longer than preceding, and broadly rounded apically; ovipositor exceeding pygofer by one-third the length of the latter. Male valve broad and triangular; plates strongly narrowed on basal half, then produced into long acute tips; pygofer short, about one and one-third times as long as plates, apex rather acute and open ventrally.

Internal male genitalia: Oedagus rather short,

sides parallel, narrowed apically, bearing a pair of unbranched processes cephalad of the notched apex, process rather long and quite slender; gonopore opening near apex.

Holotype, female, Ft. Scott, Kans., Aug. 16, 1924, E. P. Breakey. **Allotype,** male, same data. A small series of **paratypes** on hand from Ft. Scott, Kans., Norton County, Kans., Crevecouer, Mo., and Lakeland, Minn. Types deposited in Snow Entomological Collection.

Parabolocratus planus sp. n.

Pl. I, figs. 7, 18; pl. II, figs. 2, 12; pl. III, figs. 3, 3a.

Allied to **major** but slightly larger. Vertex somewhat shorter than wide disc very flat, margin strongly reflexed and quite foliaceous. Length, female 7.4 to 8.9 mm.; male 5.4 to 6.4 mm.

Vertex somewhat shorter than wide, usually definitely angulate especially in male, margin very thin, strongly reflexed and quite foliaceous. Pronotum shorter than vertex. Elytra of female exposing one or two abdominal segments; elytra of male barely to well exceeding abdomen.

Color: Yellowish green with a few of the females straw colored. Face of female usually with faint brown line below margin of vertex; face of male usually with a more definite brown line below margin of vertex but not extending from eye to eye as in **viridis.** Lateral margins of pronotum whitish. Elytra with base of costal margins whitish, the apices brownish, usually with a very small brown spot at tip of clavus. Tip of ovipositor reddish.

External genitalia: Female last ventral segment usually about twice as long as preceding, posterior margin roundingly produced; ovipositor exceeding pygofer by one-third the length of the latter. Male valve smaller and rather broadly rounded; plates strongly narrowed on basal half, then produced into long acute tips; pygofer short, about one and one-third times as long as plates, apex rather acute and open ventrally.

Internal male genitalia: Oedagus strongly narrowed apically when viewed dorsally, bearing a pair of unbranched processes preapically, which are rather long and quite slender. The middle third of the oedagus also bears two rows of teeth on the dorsolateral margins,

and teeth are also borne along the ventral side. Oedagus parallel when viewed laterally with gonopore opening near the apex.

Holotype, female, Bakersfield, Calif., July 24, 1929, R. H. Beamer. **Allotype,** Lemon Cove, Calif., July 26, 1929, R. H. Beamer. A large series of **paratypes** are on hand from Bakersfield, Lemon Cove, Indio, Calif., and Orange County, Calif. Types deposited in Snow Entomological Collection; six paratypes from Benicia, Calif., Aug. 26, 1897, A. Morse, are deposited in the United States National Museum.

Parabolocratus brunneus Ball

Pl. 1, fig. 11; pl. II, fig. 8.

Parabolocratus brunneus Ball, Rept. Ia. Acad. Sci. for 1899, p. 71, 1900.

A rather small robust species with margin of vertex quite thick. Length, female 5.7 to 7.1 mm.; male 3.5 to 4 mm.

Vertex of female shorter than wide, but slightly angulate; margin not at all definite except at apex, front quite full. Pronotum as long as vertex. Elytra broad, rounded at the apices, exposing three or four abdominal segments.

Color: Female yellowish green. Lateral margins of pronotum whitish. Costal margins of elytra whitish, apices usually brownish. Tip of ovipositor reddish.

External genitalia: Last ventral segment of female almost twice as long as preceding, posterior margin with a distinct median lobe and distinct lateral angles; ovipositor exceeding pygofer by about one-third the length on the latter.

Dr. Ball's description of the male is as follows: "Male; smaller, narrower, with a short and still more bluntly rounded vertex; the elytra always long, covering the abdomen.

"Color; male, pale green, the posterior part of pronotum and the elytra washed with testaceous brown, the elytra nervures fuscous brown.

"Genitalia; male, valve concealed; plates broad at base, rapidly, roundingly narrowed to the middle, beyond which they extend as finger-like plates; a fuscous crescent inside the margin on either side at the base, spines on the pygofers fuscous."

Distribution: This species has hitherto been recorded from Colo., and Nebr. Specimens are also on hand from N. Mex., and Scott County, Kans.

PLATE I.

The Genus **Parabolocratus** J. G. Shaw.

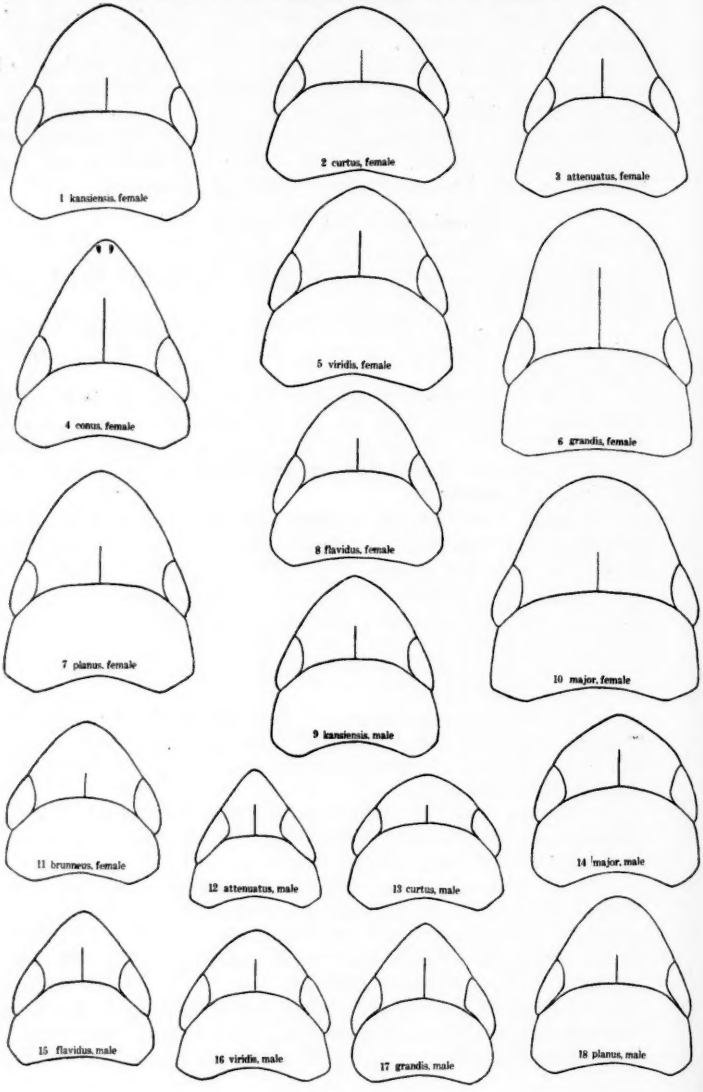


PLATE II.

The Genus **Parabolocratus** J. G. Shaw

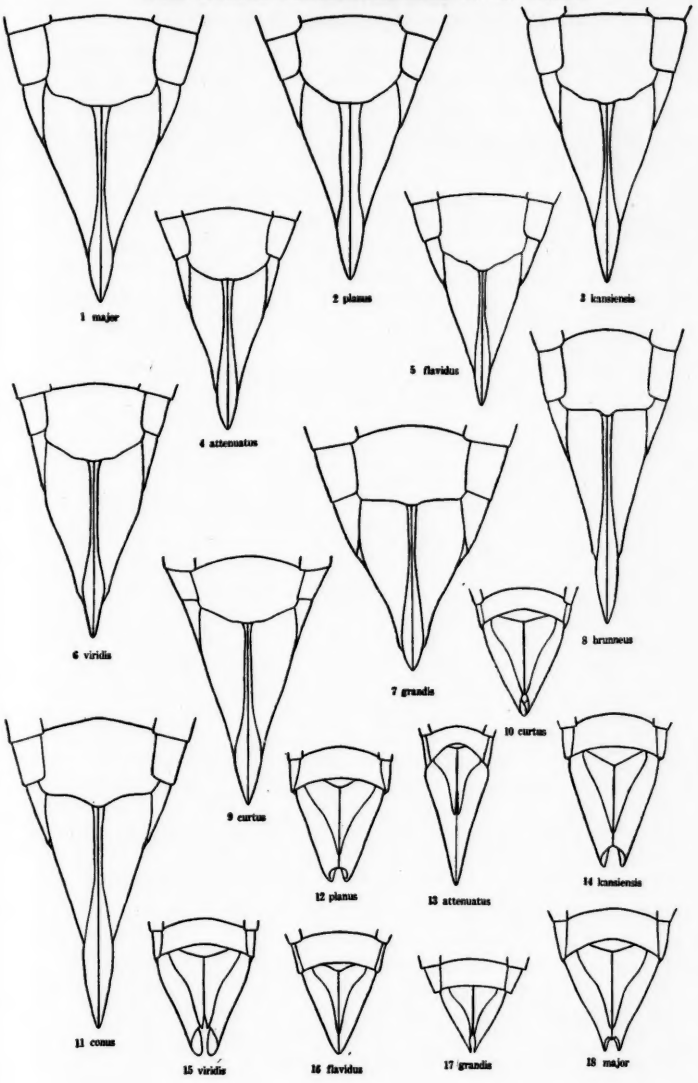
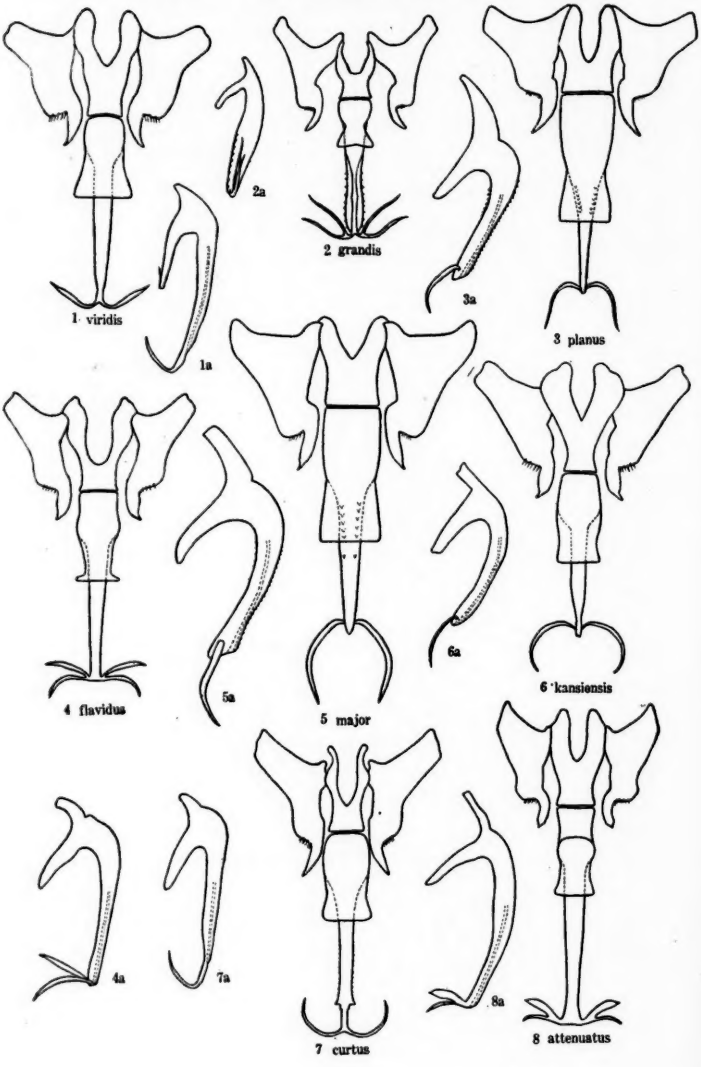


PLATE III.

The Genus **Parabolocratus** J. G. Shaw



NEW NOTONECTA OF THE N. MEXICANA A. & S. GROUP.

By

H. B. HUNGERFORD, Lawrence, Kansas *

During recent years I have received for determination some unnamed Notonecta the descriptions of which follow.

Notonecta mexicana var. **creaseri** sp. n.

Size: Length 12 mm.; width of pronotum 4.3 mm.

Color: The four specimens at hand are tan and black with one specimen showing some flecks of red on the corium. Head and legs testaceous. The femur with a longitudinal stripe which is characteristic of entire group. Scutellum is black or nearly so, three of the specimens with lateral margins tan. The clavus and corium mostly tan. The distal third of corium more or lass dark. Membrane nearly black. It is probable that this variety like other species in the group may have red or nearly black in place of the tan on the hemelytra.

Structural characteristics: Anterior outline of the head viewed from above flattened. Vertex longer than its anterior width; margin of vertex less convex and shorter than frontal margin of the eye. Anterior breadth of vertex: synthlipsis:: 11:4 (in the female). In the male the synthlipsis is a little narrower. Pronotum about twice length of head. Lateral margins short, divergent, but quite concave in the females and plainly so in the males. Anterior angles embracing the eyes. Lateral ledge as seen from the side with anterior three-fifths broad and nearly horizontal and posterior two-fifths faint and oblique. The anterior angle deflexed. The length of the ledge less than the rear margin of the eye below it. Anterior lobe of the membrane of the hemelytron distinctly longer than the posterior lobe. The anterior trochanter of the male with a rather narrow pointed hook. Mesotrochanter rounded. The genitalia in both sexes like **N. mexicana** A. & S.

Location of Types: Described from four specimens labeled, "Mexico, Nueva Leon, Santiago, Apr. 19, 1930, 13. Creaser-Gordon." **Holotype** and **Allotype** in

* Contribution from the Department of Entomology, University of Kansas.

Museum of Zoology, Michigan University. **Paratype** in Entomological Museum, University of Kansas.

Comparative notes: This is smaller than the typical **N. mexicana** A. & M., but in the characters of the genitalia indistinguishable from it.

Notonecta robusta sp. n.

Size: Length (of male) a trifle less than 15 mm.; the width of pronotum 5.1 mm.

Color: The holotype has the head, pronotum and limbs dark testaceous. The trochanters and femora marked as in other species of the **N. mexicana** A. & S. group. Scutellum black and the hemelytra nearly black. No doubt this species may have hemelytra that are tan or red with black membrane.

Structural characteristics: Anterior outline of the head, viewed from above flattened. Vertex about as long as the anterior width; margin of vertex less convex and shorter than the frontal margin of an eye; anterior breadth of vertex: synthlipsis::10.5:4. Pronotum about twice length of head. Lateral margins divergent and nearly straight in the male. Anterior angles not embracing the eyes. Lateral ledge as seen from the side, slightly undulate, upturned at both ends, oblique and shorter than the rear margin of the eye below it. Scutellum and ridge of hemelytral suture equal in length. Posterior lobe of membrane a little longer than anterior lobe. The anterior (outer) margin of the membrane constricted at the embolial suture and undulate. Anterior trochanter of male with short hook. Mesotrochanter rounded. Male genital capsule much like **N. mexicana** A. & S. but the clasper with the tip broader and the rear margin more concave.

Location of Type: Described from a single male specimen which bears no locality or collector's label. Deposited in Entomological Museum, Universty of Kansas.

Comparative notes: Agrees with other species of **N. mexicana** A. & S. group in having the keel of fourth ventral abdominal segment bare, the hairs confined to the sides. Head broad, eyes large and broad, rear margin broader than the length of the lateral margin of prothorax. Scutellum conspicuously broader than long. It differs from **N. lobata** Hungerford in having the last abdominal sternite of male normal in size. I have two female specimens, red and black in color, from San Cristobal, Chiapas, Mexico, A. Dampf., that are the broadest, most robust Notonecta known to me. The

lateral margins of the pronotum are greatly constricted near the front so that the anterior angles flare out. The very marked undulation of the anterior (outer) margin of membrane suggests to me that these may be females of **N. robusta** Hungerford.

Notonecta rogersi sp. n.

Size: Length 13 mm.; width of pronotum 4.6 mm.

Color: The male holotype is nearly black. The head, pronotum and limbs dark testaceous. Femora marked as in above species. The scutellum black. The anterior margin of clavus and an oblique streak on corium red, remainder of hemelytra dark brown to black. When other specimens have been found the color range will doubtless be the same as for other species of the group.

Structural characteristics: Anterior outline of head viewed from above flattened. Vertex slightly longer than anterior width; margin of vertex less convex and shorter than frontal margin of an eye; anterior breadth of vertex: synthlipsis::11:3.3 Pronotum trifle less than twice the length of the head. Lateral margins of prothorax divergent and moderately concave. Anterior angles not embracing the eyes. Lateral ledge, as seen from the side, undulate, oblique and shorter than the rear margin of the eye below it. Anterior lobe of membrane a little longer than posterior lobe. Anterior trochanter of male with short hook. Mesotrochanter rounded. Male genital capsule and claspers very close to **N. ceres** Kirkaldy (=**N. hades** Kirk.).

Location of Type: Described from a single male bearing the following labels: "Irazu, 6-7000 ft. H. Rogers" "Museum Paris, Amerique Centrale, Godman 1908", "B. C. A. Rhyn. II. **Notonecta mexicana** A. & S." Type deposited in Paris museum.

Comparative notes: Much like **N. ceres** Kirkaldy (=**N. hades** Kirkaldy) but larger, lateral margins of pronotum concave instead of straight in the male and the ledge brooder in front.

THREE NEW SPECIES OF METROBATES (= TREPOBATOPSIS CHAMPION).

By

LAUREN D. ANDERSON, Lawrence, Kansas *

Metrobates artus sp. n.

Size: With genital segments; male 3 mm. long and 1.1 mm. wide; female 3 mm. long and 1.8 mm. wide.

Color: Opaque, velvety, lead-gray, and black, with yellow and orange markings on the appendages, head and prothorax. First antennal segment amber at base with rest black, second all amber except the tip which is black, third and fourth black. On the head there are two diverging orange spots on the posterior margin between the eyes, and four distinct black spots in a line parallel to the inner margin of the eyes. The pronotum has a slightly depressed orange area in the center. The mesonotum with a gray median band, darker on either side. Fading to gray laterally. Genital segments black.

Structural characteristics: The fore tibia armed on the inner angle of the distal end with a prominent spine (a male character), and one to several long hairs. The relative average length of the antennal segments; male, 1st. 25.7, 2nd. 9.6, 3rd. 5.8, 4th. 7; female, 1st. 25, 2nd. 9.8, 3rd. 6, 4th. 7. Second and third antennal segments armed with a double fine toothed comb at the distal end. Head (with eyes) robust, wider than prothorax. Pronotum sub-rectangular, flat, small and set in mesonotum. Mesothorax broad, latero-anterior margins projecting along sides of the pronotum, dorsomesally divided, doro-posterior margin with a median V-shaped notch. Metanotum sub-rectangular, about twice as wide as long, with posterior margin slightly sinuate, and crossed by a median transverse, anteromesally curved sulcus. Abdomen without genital segments, one-half as long as the thorax, nearly as wide as long, bent downwards in middle, genital segment (male) truncate; female genital segment short, usually withdrawn in sixth abdominal.

Male clasper, flat, about one-half mm. long, one-twelfth mm. at widest place, and has a restricted right angle bent two-thirds the distance back from the distal

* Contribution from the Department of Entomology, University of Kansas.

point, the distal two-thirds is lance like, tapering to a sharp point. Clasper of **M. trux** (Bueno) and **M. denticornis** (Champion) are about the same length but much wider and more swollen and have a very blunt point. Claspers of **M. hesperius** Uhler and **M. tumidus** sp. n. are only half as long and are very plump, almost club-like. Claspers of **M. porcus** sp. n. shorter, broader, and with rounded point.

Holotype, wingless male, **Allotype,** wingless female, **Paratypes,** wingless, 12 males, 20 females, Cameron Co., Tex., Dr. R. H. Beamer collector, Aug. 3, 1928; 1 male, 2 females, Kendall Co., Tex., Dr. R. H. Beamer collector, Aug. 7, 1928; 2 females Brazoria Co., Tex., Aug. 12, 1928; and 1 female Bowie Co., Tex., Aug. 16, 1928, Mrs. R. H. Beamer collector. Types in Entomological museum, University of Kansas, Lawrence, Kansas.

Notes: Arranging the species of **Metrobates** Uhler according to the dorso-ventral thickness of the thorax, **M. trux** (Bueno), **M. denticornis** (Champion) and **M. porcus** sp. n. would be dorso-ventrally flattened and **M. hesperius** Uhler more upright, with **M. tumidus** sp. n. and **M. artus** sp. n. as the intervening steps, the latter being the thinner. **M. artus** is readily separated from the other five by having the second antennal segment amber color, absence of heavy spines on the fore femur or mesosternum, Mesosternum with median suture, and a very characteristic male clasper.

Artus is a Latin adjective meaning narrow, which partly describes the form of the male claspers.

Metrobates tumidus sp. n.

Size: With genital segments; male 4 mm. long and 1.4 mm. wide; female 4 mm. long and 1.9 mm. wide.

Color: Opaque, velvety, lead-gray, and black, with yellow and orange markings on the appendages, head, and prothorax. First antennal segments amber at base with the rest dark, second, third, and fourth dark. Head with two diverging orange spots on the posterior margin between the eyes, otherwise black. Pronotum with slightly depressed orange area in the center. Mesonotum with gray median band, darker on either side fading to gray at the lateral margins. Abdominal segments lead-gray with dark margins. Genital segments dark.

Structural characteristics: The fore tibia armed on the inner angle of the distal end with a prominent

spine (a male character) and one to several long hairs. The relative average length of the antennal segments; male, 1st. 24, 2nd. 7.4, 3rd. 5, 4th. 7; female, 1st: 23, 2nd. 7, 3rd. 5, 4th. 7. Second and third antennal segments armed with double fine toothed comb at the distal end. Head (with eyes) robust, wider than prothorax. Pronotum sub-rectangular, flat, small and set in mesonotum. Mesothorax broad, latero-anterior margins projecting along sides of the pronotum (not so noticeable as in **artus, denticornis, porcus** and **trux**), dorso-mesally divided, dorso-posterior margin with a median V-shaped notch. Metanotum, subrectangular, about twice as wide as long, with posterior margin slightly sinuate, and crossed by a median transverse, antero-mesally curved sulcus. Abdomen, without genital segment, one-half as long as the thorax, nearly as wide as long, bent downward in middle. Genital segment male, truncate; female genital segment short, not withdrawn in sixth abdominal.

Male claspers are the best character in distinguishing this species. The claspers are the smallest of the claspers found in the genus **Metrobates** Uhler. They are less than one-fourth of a millimeter long, the distal portion is flat and dick-like, attached to the main body by a relatively slender stalk. Differs from **M. artus** sp. n., **M. denticornis** (Champion), **M. trux** (Bueno), and **M. porcus** sp. n., by the latter's greater length and size, and differs from **M. hesperius** Uhler in that it is some smaller, and does not have the incurved margins that **M. hesperius** possesses.

Holotype, wingless male, **Allotype,** wingless female, one **Paratype,** wingless male, Spanish Town, St. Cathrine, Jamaica, March, 1899. **Paratypes** wingless, one male and three females from Mina Carlota. Trinidad Mts., Cuba, March 22, 1925. Collected by J. G. Myers. Types in Entomological Museum, University of Kansas, Lawrence, Kansas.

Notes: Arranging the species of **Metrobates** according to the dorso-ventral thickness of the thorax, **M. porcus** sp. n., **M. trux** (Bueno) and **M. denticornis** (Champion) would be dorso-ventrally flattened and **M. hesperius** Uhler more upright, with **M. artus** sp. n. and **M. tumidus** sp. n. as the intervening steps, the latter being the nearer to **M. hesperius. M. tumidus** is readily separated from the other five by having such a characteristic clasper, and form of mesothorax, slightly longer

and narrower body and darker color.

Tumidus is a Latin adjective meaning swollen, which partly describes the form of the male claspers.

Metrobates porcus sp. n.

Size: With genital segment; male 3.8 mm. long, 2 mm. wide, and .75 mm. thick; female 4 mm. long, 2.4 mm. wide, and .80 mm. thick.

Color: Opaque, velvety, lead-gray, and black, with yellow and orange markings on the appendages, head and thorax. First antennal segment amber at base, with the rest black, second with basal half amber, third and fourth all black. Head black with two diverging ellipical orange spots on the dorsal posterior margin between the eyes. The darker forms have a slightly depressed orange area in the center of the pronotum. Mesonotum with four longitudinal irregular black bands interspaced by three lead-gray bands. Genital segment dark. Abdomen lead-gray with posterior margin of each segment black.

Structural characteristics: The males have two very characteristic prominent downward projecting, yellow, dark tipped, spines on the mesoternum at the base of each coxa, a character not found in any of the other species described in this paper. The fore tibia armed on the inner angle of the distal end with a prominent spine (a male character), and one to several long hairs. The relative average length of the antennal segments; male, first 24.5, second 7, third 5.2, fourth 7; female the same. Second and third antennal segments armed with a double fine toothed comb at the distal end. Head (with eyes) robust, wider than prothorax. Pronotum sub-rectangular, flat, small and set in mesonotum. Mesothorax broad, latero-anterior margins projecting along the sides of the pronotum practically touching posterior margins of the compound eyes, dorso-mesally divided, dorso-posterior margin with a median V-shaped notch. Metanotum, subretangular, almost twice as wide as long, with posterior margin slightly sinuate, and crossed by a median transverse, anteror-mesally curved sulcus. Abdomen, without genital segment one-half as long as thorax, nearly as wide as long, normally flat, genital segment (male) truncate; female genital segment short, usually nearly withdrawn under sixth abdominal tergum. Posterior margin of the sixth tergum (female) three or more times width of genital segments

(not true with females of other known species).

Male claspers flat, about .4 mm. long, .1 mm. at widest place, has a rounded right angle bend two-thirds the distance back from the distal point, the distal two-thirds is lance-like, not coming to the acute point as in **M. artus** sp. n. In size the claspers are between **M. hesperius** Uhler, and **M. artus** sp. n. The outer portion of the right angle bend is nearly a perfect arc. **M. trux** (Bueno) and **M. denticornis** (Champion) have much heavier broader claspers and **M. tumidus** sp. n. smaller and more plump.

Holotype wingless male, **Allotype** wingless female, **Paratypes,** wingless, thirty-two males and twenty-three females, and ten nymphs. From Rio Grande, B. Honduras, B. S. I., November, 1931, by J. J. White. Types deposited in Entomological Museum, University of Kansas, Lawrence, Kansas.

Notes: Arranging the species of **Metrobates** Uhler according to the dorso-ventral thickness of the thorax, from the flatter to the thicker: **M. porcus** sp. n., **M. denticornis** (Champion), **M. trux** (Bueno), (the last two practically the same), **M. tumidus** sp. n., **M. artus** sp. n., and **M. hesperius** Uhler. **M. porcus** is readily separated from the other five species by the presence of the mesothorasic spines and claspers of the male, and shape of the sixth tergum of the female.

The name porcus suggested by the present economic depression.

A MARTAREGA FROM BRITISH HONDURAS (HEMIPTERA, NOTONECTIDAE)

By

CLARENCE O. BARE, Sanford, Florida. *

It is through the courtesy of Dr. H. B. Hungerford of the University of Kansas that a number of specimens were sent me from which this new species from Central America is described.

Martarega hondurensis n. sp.

Size: Males, length 5 to 5.5 mm., width about 1.7 mm.; females, length 5.3 to 5.9 mm., width about 1.8 mm.

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* Contribution from the Department of Entomology, University of Kansas.

Color: Eyes reddish or fuscous; labium and distal segments of beak fuscous; swimming hairs or setae of underside of body, median ventral carina, hind tibia and tarsus mostly fuscous; leg segments at distal ends mostly fuscous tipped; remainder of insect yellowish or straw-colored.

Structural characteristics: Ocular commissure about 5/9 of width of an eye as seen from dorsal view.

Relative lengths of parts of legs about as follows in mm.:

	Femur	Tibia	Tarsus 1	Tarsus 2	Claws
Front leg of males	.8	.7	.3	.25	.3
Front leg of females	.7	.8	.9	—	.3
Middle leg	.9	.8	.65	—	.3
Hind leg	2.7	2.3	1.7	.7	.1

Tarsal claws of fore and middle legs of unequal lengths.

Two narrow translucent shining streaks in hemelytron, one in or near position of the midvein extending full length of wing, the other short and near apex of hemelytron. The longer shining translucent streak in hemelytron of female appears bifurcate about 1/3 the length from the apex, in male not appearing bifurcate. Hind wings apparently absent.

Inner margin of hind femora lined with about 20 setaceous spines.

Type locality: Rio Grande, British Honduras.

Types: Described from 336 specimens, 158 males and 178 females, all bearing label, "Rio Grande, B. Honduras, BWI, Nov. 1931, J. J. White". **Holotype** male, **allotype** male, and **paratypes** (157 males and 177 females) 1-334 inclusive.

Location of types: In Snow Entomological Collection: **Holotype, allotype,** and **paratypes** 1-50 and 72-336 in author's collection, paratypes 51-71.

Comparative notes: Easily distinguished from the other three described species of **Martarega** by the narrower and otherwise different shining translucent streaks of the hemelytron. **Martarega mcateei** Jaczewski is much larger and stronger. Structural drawings will be presented in a forth-coming paper.

ERYTHRONEURA COLLECTED ON APPLE WITH DESCRIPTION OF A NEW SPECIES.

By

R. H. BEAMER, Lawrence, Kansas *

Erythroneura dowelli n. sp.

General ground color semihyaline to white with bright red oblique vittae. Vertex with inverted V-shaped mark, sides almost parallel, barely touching eyes, continued across pronotum as diverging, gradually widening vittae, meeting scutellum at colored basal angles. Scutellum with red tip connected to basal angles with band which completes the enclosure of an arrow-shaped white mark extending from tip of scutellum to tip of vertex. Clavus half occupied by red stripe along claval suture. Coria with narrow stripe on costal margin and another on Cu arising opposite middle of clavi and ending at cross-veins. Another short dash of red between costal plaque and cell R1. Beyond cross-veins more or less dusky.

Venter stramineous. Face sometimes with red band about margin. Red band from posterior margin of eye to posterior margin of mesopleura. Hind tibia with one row of black spines.

Genitalia.

Style with medium foot; base straight; heel medium; anterior point not quite as long as toe is wide, projecting out; posterior point at least twice as long as anterior, projecting at right angles to base of foot, narrower than anterior. Oedagus of medium length, dorsally curved in lateral view, slightly narrowed at tip: with a pair of processes arising ventrad to base of shaft, almost parallel with it, ending near its tip.

Holotype male, **allotype** female, and 23 **paratypes**, Douglas Co., Kans., October 3, 1931, R. H. Beamer; 85 paratypes from Fayetteville, Ark., October 21, 1931, A. W. Dowell. In addition to the paratypes I have 6 specimens from Franklin Co., Pa., J. O. Pepper.

This species is bright red in its markings like **E. noevus** (Gill.) but has no dark markings on scutellum

* Contribution from Department of Entomology, University of Kansas.

or mesosternum. The male genitalia separate it from all other species.

All of the specimens were swept from apple. I take pleasure in naming it for Mr. A. W. Dowell who collected many of the paratypes.

Erythroneura magnacalx Beamer

Allotype, female, Fayetteville, Ark., October 21, 1931, A. W. Dowell, and numerous **parallotypes** same data.

This sex has not been previously known. It agrees in every way with the male.

Erythroneura Damaging Apple

The foliage of scion orchards in Douglas and Franklin counties, Kansas, was damaged again this last year (1931) by grape leaf hoppers. Sweepings taken in Douglas County, October 3, 1931, revealed the following species present in the order named: **E. lawsoniana** Baker, **E. omani** Beamer, **E. dowelli** n. sp.

There were a few specimens of other species taken but the location was such that they could easily have been migrating forms, so they are not listed.

A few days later sweepings in Franklin County, Kansas, revealed **E. lawsoniana** Baker very numerous; a good many specimens of **E. omani** Beamer; no **E. dowelli** n. sp., and practically no other species. The absence of migrating forms can probably be accounted for by the lack of hard wood trees near the orchard.

On October 21, 1931, Mr. A. W. Dowell made extensive collections of Erythroneura in the Arkansas State University Orchard near Fayetteville, Arkansas. Clean culture is practiced in this orchard and it is well removed from hard wood trees. Study of this material reveals an interesting group of the following species of Erythroneura: **magnacalx** Beamer, **lawsoniana** Baker, **dowelli** n. sp., **omani** Beamer, **vulnerata** Fitch, **compta** McAtee, **vitifex** Fitch, **tricincta** Fitch, **kanza** Robinson, **basilaris** (Say), **affinis** Fitch, **kansana** Baker, **omaska** Robinson.

The first four were present in numbers, about in the order mentioned. The remainder were represented by a few specimens each and probably were migrating forms.

Erythroneura electa McAtee.

Six specimens of this species collected on apple were received for identification from Mr. McConnell of College Park, Maryland. He states that they were breeding on apple.

Erythroneura volucris Beamer.

One male of this species was determined for Mr. J. O. Pepper, Chambersburg, Pa. It was collected on apple in Franklin Co., Pa., October 30, 1930.

KANSAS ENTOMOLOGICAL SOCIETY EIGHTH ANNUAL MEETING.

The Eighth Annual Meeting of the Kansas Entomological Society will be held at McPherson, Kansas, on April 16, 1932, Room 203, Harnly Hall. The Business meeting of the organization will be held at 1:30 P. M. Beginning at 2:30 P. M. the following papers will be presented:

1. A Fossil Nepa from the Florissant..H. B. Hungerford
2. Notes on Apioceridae (Diptera).....R. H. Painter
3. Dormancy in Insects.....P. A. Readio
4. A Summary of the Population of Injurious Insects in Kansas for 1931.....R. C. Smith
5. Some Observations on the Wheat Straw Maggot (Diptera, Chloropidae).....M. W. Allen
6. Some Problems in Research Studies of Wireworms (Coleoptera, Elateridae).....H. R. Bryson.
7. The Genus Spangbergiella (Homoptera, Cicadellidae).....P. B. Lawson
8. The Genus Parabolocratus (Homoptera, Cicadellidae).....J. Gilbert Shaw
9. The Genus Carneocephala (Homoptera, Cicadellidae).....J. O. Nottingham
10. The Genus Xestocephalus (Homoptera, Cicadellidae).....Harold Peters
11. A Study of Native Prairie near Manhattan, Kansas, of Leafhopper Fauna (Homoptera, Cicadellidae).....D. A. Wilbur

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